

A QUARTER CENTURY OF GEOLOGY AT THE GULF COAST RESEARCH LABORATORY (1948-1973)

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After its founding at the Mississippi Academy of Sciences meeting on May 3, 1947 in the Buena Vista Hotel, Biloxi, Mississippi, the Laboratory offered two biological courses during its first summer session but no geology. Geology has been an integral part of Gulf Coast Research Laboratory since its second year of existence. During the first few years the abandoned Civilian Conservation Corps camp in Magnolia State Park, east of Ocean Springs, was used for housing the Laboratory. The activity was directed by Dr. R. L. Caylor, Chairman of the Science Division, Delta State Teachers College in Cleveland, Mississippi. An assortment of temporary buildings served as residence, office, library and dining hall. From surplus army equipment additional dormitory buildings were constructed and vessels of the Mississippi Sea Food Commission were borrowed at Ocean Springs Harbor for field work. The Mississippi Board of Trustees of Institutions of Higher Learning was induced to assume responsibility for the Laboratory and the State Legislature established it as a state institution in 1948 and appropriated ten thousand dollars for its operation in 1948-50.

Doctor Caylor served for several years as director of the Laboratory. He was only on the grounds permanently during the summer. He invited Dr. Richard R. Priddy, Chairman of Geology at Millsaps College in Jackson (1948-1972) to help develop a geology teaching program and join the Executive Board of the Laboratory. Priddy's participation had a profoundly beneficial effect on the geological work for years to come. With youthful enthusiasm and interest in his subject he gradually overcame the problems created by the lack of equipment, primitive, inconvenient facilities and his initial unfamiliarity with coastal geology. Makeshift instruments (sediment corers, oxygen and pH-meters, etc.) had to be manufactured. In the coming decades practically all Millsaps geology majors and several chemistry majors attended geology courses offered during the summers. These courses, in fact, were made a recommended summer field camp substitute for the Millsaps geology majors.

While in 1947 only botany and marine biology were taught, in August of 1948 geology became the third established course and a two-week marine sedimentation problems class was taught by Priddy with the assistance of C. P. Marion, a graduate student at Mississippi

State College. Between 1949 and 1955 the course was called Marine Sedimentation. After 1948 all geology courses lasted three weeks and carried three hours credit. The four students in 1948 (C. A. Barton, E. R. Campbell, F. G. Clark and W. E. Cook) were all from Millsaps and students from this college were always very well represented in the geology classes of the following summers (Table 1).

In the early years sediment sampling from the Biloxi Bay bottoms and the surrounding beaches occupied the course, along with the description and grain size analysis of the samples. Later the class projects became more varied and carried students to many different locations along the Mississippi shore. Marion taught the geology course during the summers of 1949-50. In 1952 Arthur T. Allen of Emory University was the instructor and during the following three summers Dr. Olin T. Brown of Mississippi Southern College (later University of Southern Mississippi) taught the course. Priddy taught in 1951 and again from 1955-58. In those formative years all professors practically donated their efforts and time. In the beginning the teaching and research work at the Laboratory was largely restricted to the summer months. As late as 1954 the year-round staff consisted of three part-time clerical and maintenance personnel and only two full-time scientific staff members, including Dr. A. E. Hopkins, the director who had become the first full-time director in 1952. It was not until 1961 that the first full-time geologist assumed his duties.

The physical expansion of the Laboratory and its geological facilities proceeded slowly but steadily. With the help of the Executive Secretary of the Board of Trustees of Institutions of Higher Learning, the Laboratory acquired the Smart property on Davis Bayou, a mile and a half south of the facilities in Magnolia Park. The purchase price was \$35,000. A 2½-story main building (Fig. 1) that became known as the "Big House," was a former summer home that had been constructed in 1900. The surrounding 49 acres of land was a beautiful setting on a small peninsula bounded by Halstead, Stark and Davis bayous. In 1950, the "Big House" was occupied by Laboratory personnel and a fire in the Magnolia Park facilities during August of that year hastened the completion of the move to the Smart property in 1951.

One of the auxiliary structures behind the site of the future Hopkins Building, by the boat harbor, became the "mud shack", a one-room geological classroom-laboratory building. This had been a former servant's quarters. Between 1961 and 1965 the small kitchen and pantry of the "Big House" were used for the geology office and storage room. With the exception of two wooden dormitories, Laboratory buildings were clustered on low ground along Davis Bayou. The dormitories were reassembled on the slopes of the "Hill", the densely wooded, flat-topped "hinterland" which formed the center of the small

Table 1.
Attendance of Summer Geology Classes at Gulf Coast Research Laboratory 1948-72

College of Origin	1948-52 *1	1953-57 1 *2	1958-62 1 2	1963-67 1 2	1968-72 1 2	TOTAL 1948-72 1 2
Millsaps College	22	20	8	16	20	86
Mississippi State U. (Mississippi State Col.)	5	4	2	3	2	23
U. of Southern Mississippi (Mississippi Southern Col.)	4	39	1	5	4	53
U. of Mississippi	0	0	4	0	4	8
Other (*from 11 states)	2	3	1	5	9	25
TOTAL	33	66	28	31	39	195

*1. "Marine Sedimentation" - "Marine Geology" - "Physical Marine Geology" courses.

*2. "Problems in Sedimentation" - "Chemical Marine Geology" courses.

*Other teaching institutions represented by students were located in Alabama, Florida, Georgia, Illinois, Louisiana, Missouri, New York, Ohio, Pennsylvania, Tennessee and Texas,



Figure 1. The "Big House" shrouded by live oaks, from the pier. The building was demolished by the 1969 hurricane and a parking lot covers its site. (Photo by J. O. Snowden)

peninsula at 15–18 feet elevation and provided the potential for the further expansion of the Laboratory.

In addition to sediment studies in the Biloxi Bay area the study of water and sediment chemistry of the bays and bayous became an important subject during the summer sessions. Priddy in 1952 involved Dr. Franklin W. James of the Millsaps Chemistry Department in the study of Fe, Si, Ca, Mg, nitrate, nitrite, sulfate, sulfide, organic carbon and other components of the coastal waters and sediments. Priddy likewise involved Dr. Joseph B. Price, Chairman of the Millsaps Chemistry Department, in this study from 1954 until his untimely death in 1963. Salinity, redox-potential, pH, chlorinity and other characteristics were studied in some detail. A few Millsaps chemistry majors also took part in this study, including J. D. Powell and Hugh Burford. Numerous abstracted progress reports and papers originated from these investigations. Two of the papers, by Priddy and Price, dealt with colorimetric and rapid volumetric analysis methods of brackish waters and an issue of the Mississippi Geological Survey Bulletin contained the summary of the analytical results of the Mississippi Sound work. As a result of this emphasis on water and sediment chemistry, two geology courses were offered, starting in 1956. "Marine Geology" (later renamed "Physical Marine Geology") dealt with physical geological and sedimentological aspects of coastal



Figure 2. Dr. Joseph B. Price, Chemistry Chairman and A. D. Bishop, 1960 summer student (both of Millsaps) in the old Hopkins Building. (Photo by J. O. Snowden)



Figure 3. Professor R. R. Priddy in the Hopkins Building (before Hurricane Camille). (Photo by Dr. J. O. Snowden)

geology, while "Marine Sedimentation" (later renamed "Problems in Sedimentation", and still later as "Chemical Marine Geology") concerned itself with the analysis of chemical components and of the physico-chemical properties of bottom sediments and of the coastal water bodies. Until Dr. J. O. Snowden, Jr., one of Priddy's former students and a member of his Millsaps faculty at the time, took over the teaching of the chemical marine geology course in 1968, Priddy taught it every summer with the exception of 1959. The Laboratory hosted regional geology courses for college instructors during the consecutive summers of 1965-68. These National Science Foundation-sponsored courses were directed by Priddy in the Caylor Building.

Physical facilities were slowly improving. Since its completion in June 1951, the geology classes were able to utilize parts of the small (30 by 60 feet) Caylor Building, the first brick structure on the campus. After the arrival of Dr. Gordon Gunter in 1955 to be director of the Laboratory, a second one-story classroom-laboratory building, named after A. E. Hopkins, was opened in 1956 and all of the Caylor Building along with parts of the Hopkins Building were used for geological purposes. Both these structures and the "Big House" were demolished in the 1969 hurricane and only the Hopkins Building was rebuilt thereafter. By this time, however, geology work had for several years been occupying modern, well-equipped, air-conditioned



Figure 4. The old, un-air-conditioned Hopkins Building before Hurricane Camille. (Photo by J. O. Snowden)

quarters in the Oceanography Building on the top of the "Hill" which, when completed in May 1965, became the center of the Laboratory complex.

In 1959 both geology courses were taught by Dr. A. R. Cariani of University of Mississippi. The following year when the Laboratory still had only six resident scientists, including Doctor Gunter, Dr. David A. DeVries of Mississippi Southern College taught Physical Marine Geology. He became resident geologist in 1961 and taught the course as a member of the staff through the summer of 1966. Between the summer of 1967 and January 1971, this position was filled by W. L. Siler.

Student class reports written under the supervision of DeVries and Priddy indicate a variety of study projects during the summers. Modern beach sands were investigated on Horn, Ship and Round Islands and on Belle Fontaine Beach; ancient beach sands were studied at Belle Fontaine, changes of the Marsh Point sand spit were measured and recorded in great detail and minor and major beach forms investigated in several areas. One of the most original projects was jet-drilling with a centrifugal pump from a boat in Davis Bayou in estab-



Figure 5. 1960 Chemical Marine Geology class at the Laboratory. Front row, left-to-right: Fred Lockett, Martin Hobbs and Dr. R. R. Priddy. Back row: Frank Brooks, Joe Snowden, Al Bishop, Dr. J. B. Price and Billy Moore.

lishing the configuration of an incised Late Pleistocene stream valley in the continuation of the present Stark Bayou. This gully was filled in and buried by Holocene deposits. Some of the heavy mineral, microfauna and other studies which were initiated during the summer sessions developed into masters theses and several abstracts and papers were published later. Similar abstracts resulted from the chemical studies of Priddy and his associates on the sulfur cycle, flocculent materials, Eh-pH conditions, humus content and other aspects of the bottom muds and the waters of Mississippi Sound and adjacent bays and bayous.

Doctor Snowden of Louisiana State University in New Orleans and the writer (who became affiliated with the Laboratory on a part-time basis on July 1, 1970 and became Geology Section Head June 1, 1971) have undertaken an extensive study of the chemistry and sedimentary petrology of the deposits, the chemistry and the pore-water and overlying free-water bodies along the entire Mississippi coast with a grant from the Water Resources Institute under the U. S. Office of Water Resources Research. The Pearl, Wolf and Pascagoula river estuaries and Davis, Heron, Old Fort and Graveline bayous were investigated in this respect during 1970-72. Instead of the time-consuming classical titrimetric methods, atomic absorption spectrometry was employed and the salinity of the squeezed-out pore water measured by the micro-resistivity method. The sulfate, nitrite and nitrate content of the water samples was determined by the fast turbidimetric analysis. These new methods were introduced in Dr. J. O. Snowden's course in which water chemistry and the chemical interaction between interstitial pore water and the enclosing sediments has been emphasized.

As the result of Doctor Gunter's vigorous program of development and expansion of the Laboratory, several large modern buildings were added in 1965-71. Recovery was fast from the severe devastation of Hurricane Camille in August 1969 with generous federal, state and private aid. The Instructional Facility and Oceanography Buildings became the largest on the campus, both with approximately 18,000 square feet gross area. A physical marine geology and a chemical marine geology classroom with adjoining office and storage rooms opened in the two-story Instructional Facility Building in 1971 (renamed Richard L. Caylor Building in 1973) and additional space was utilized for geological research and sample storage in the new Research Facility Building the same year. A new exhibition center near Point Cadet, Biloxi, prompted planning of part of the future exhibit to demonstrate the geological makeup and history of the coast and the role environmental geology plays in the area.

Geology has also acquired additional personnel. In 1971 Michael Bograd and Edmond Funel worked as temporary assistants in the sedimentation laboratory and the field. The following year two per-



Figure 6. Chemical Marine Geology class (August, 1962) at Horn Island. W. E. Davenport, Ethel Radzewicz (Millsaps) Marshall Kern (Mississippi Geol. Survey), L. D. Simpson (Mississippi State) and W. H. Allen (University of Mississippi). Dr. R. R. Priddy at right. (Photo by Marion Saucier)

manent assistants replaced them: Wade Howat, assistant geologist (B.S. 1971), and Joseph Milner. In 1972 Robin Wink replaced Milner as geo-technician and Mrs. Kathy Peter (B.S. 1972) also stepped in as temporary sedimentation laboratory assistant. These developments paved the way for an expanded geology program. In 1971 geology participated in an interdisciplinary project of earth resources data collection from southeastern, coastal and offshore Mississippi, relevant to the cultural, physical and economic development of the State of Mississippi. This project, which resulted in a geological bibliography and survey of the map coverage of the subject area, was done in conjunction with geology faculty members at Mississippi State University and the University of Southern Mississippi for the Earth Resources Laboratory, Mississippi Test Facility (Bay St. Louis) of the National Aeronautics and Space Administration. Since 1971 the Geology Section has also participated in another complex research project, involving the three state universities in Mississippi under the Office of Sea Grant Programs, in studying sedimentation and sediment chemistry in a St. Louis Bay oyster reef and in the Bay area in general. Another study, in cooperation with the Fisheries Section, deals with the sedimentology of Biloxi Bay and is done for the Earth

Resources Laboratory, NASA. The writer was appointed by Doctor Gunter in September 1971 to represent the Laboratory on the Universities Marine Center Marine Education Committee for Mississippi.

Since 1972 the Section has actively participated in the Environmental Affairs Committee of the Laboratory. Work of this committee has included formulating recommendations for the Mississippi Marine Resources Council about proposed construction projects in the coastal zone which could have an impact on the coastal environment in Mississippi. The head of the Section also participates in the workings of the Point Cadet Science Advisory Committee which assists in the development of the Laboratory's new exhibition-research facility, the Marine Education Center, in the southeastern corner of Biloxi. As of 1973 the author has also been charged by Director Harold D. Howse to represent the Laboratory in the recently established Mississippi Mineral Resources Institute.

Systematic acquisition of topographical, hydrological, geological and aerial photo maps has been started for a geological map collection for research and teaching purposes. The collection primarily consists of maps related to Gulf and Atlantic coastal areas but also includes archive copies of Mississippi-Louisiana area charts. Holdings of the library in geological and related fields have been steadily increasing and the library currently is subscribing to about twenty domestic and foreign periodicals, dealing with different aspects of earth sciences. During the past decade, as demands have periodically arisen, staff geologists have taught physical geology evening classes at the University of Southern Mississippi Keesler Air Force Base Resident Center in Biloxi and on Gulf Park Campus, Long Beach. Recently, historical and environmental geology courses were taught by the writer.

Starting in 1971 one of the main research objectives of the Geology Section has been the detailed study of the composition and geological history of the Pliocene Citronelle Formation, the Pleistocene fluvial-alluvial, brackish and nearshore-marine deposits and of the Holocene-Recent sediments, including the relationship of these units to each other and the surface configurations of the Miocene "basement" unit. The problem of the older (pre-Sangamon), higher Pleistocene marine deposits, barrier beach ridges was investigated not only in the Mississippi Coast but also in adjoining states and the coastal Florida Panhandle. Correlation problems of the Citronelle under the present Pleistocene coastal plains and its distinction from underlying Miocene and overlying Pleistocene formations are among the several problems, as is the nature and origin of "terraces" and scarps in the coastal zone. The Late Pleistocene (Sangamon) Waveland-Gulfport-Belle Fontaine mainland barrier ridge system is now being investigated in great detail. Other field studies revealed that there is no geological proof for the existence of earlier Pleistocene, higher coastal



Figure 7. Physical Marine Geology class in the Sedimentation Laboratory, Oceanography Building, 1971. Mary Whitten (left) and Norma Weaver, University of Mississippi students with author. (Photo by Catherine Campbell)

ridges, previously widely reported from several areas of the north-eastern Gulf coastal region.

An extensive core-drilling program, so essential in coastal regions with few natural outcrops, was initiated in October 1971 to solve the numerous stratigraphic-geomorphological problems. The most important result of this project to date has been the recognition of a widespread, continuous, shallow stratigraphic unit under the Sangamon-age barrier ridge zone and under certain areas of the Late Pleistocene coastwise alluvial plain. This fossiliferous unit (named Biloxi Formation) appears to represent the marine transgression phase of the Sangamon Interglacial and is correlative probably along the whole northern coast of the Gulf of Mexico. Plans also call for stratigraphic exploration drilling in Mississippi Sound and on the offshore barrier islands in order to learn more about the pre-Pleistocene, Pleistocene and Holocene history of the north-central Gulf coastal-nearshore area and its relationship with the subsiding zone of the Mississippi River Delta region.

Geological field work including future detailed boring in Mississippi offshore barrier islands and the south Hancock County marsh-beach ridge complex should clarify the Holocene history of the present

offshore-inshore area and the changes (erosional destruction, island migration, accretion) which profoundly affect them. Long-range effects of natural (hurricanes) and man-made changes on these features and the resulting effects on the mainland coast and the Mississippi Sound are not yet adequately known. Such geological studies would contribute not only to the understanding of the formation and destruction of barrier islands and mainland barrier beaches during the Late Quaternary in general, but also to the clarification and possible solution of serious environmental problems along the Mississippi Coast.

Results of geological research of the past few years were demonstrated in May 1973 during a two-day field trip of the New Orleans Geological Society. The trip covered a wide area between New Orleans East and Dauphin Island, Alabama. A guidebook published for the occasion summarized the present knowledge about the Miocene-Recent coastal formations and the presently active geological processes. At the request of the Commission on Shorelines of the International Association for Quaternary Research, we are also collaborating in supplying regional information for the preparation of a set of world shoreline maps, covering the Late Pleistocene, Late Holocene and Recent shore positions.

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